

1.17.3. Example. 2. Computational mechanics. 2.1. Introduction. 2.2. Mathematical modelling of physical systems. 2.3. Continuous models. 2.3.1. Equilibrium. 2.3.2. Propagation. 2.3.3. Diffusion. 2.4. Mathematical analysis. 2.5. Approximation methods. 2.6. Discrete models. 2.7. Structural models. 3. Approximation methods. 3.1. Introduction. 3.2. Residuals. 3.3. Weighted-residual equation. 3.3.1. Example. 3.4. Approximation functions. 3.5. Admissibility conditions. 3.5.1. Example. 3.6. Global indirect discretization. 3.6.1. Satisfaction of boundary conditions. 3.6.2. Domain methods of approximation. 3.6.3. Galerkin method. 3.6.4. Least squares method. 3.6.5. Moments method. 3.6.6. Collocation method. 3.6.7. Example. 3.6.8. Example. 3.7. Integration by parts. 3.7.1. Strong, weak and transposed forms. 3.7.2. One-dimensional case. 3.7.3. Example. 3.7.4. Higher-dimensional cases. 3.7.5. Example. 3.8. Local direct discretization. 3.8.1. Nodes and local regions. 3.8.2. Satisfaction of boundary conditions. 3.8.3. Finite difference method. 3.8.4. Finite element method. 3.8.5. Boundary element method. 3.8.6. Example. 3.8.7. Example. 3.8.8. Example. 4. Interpolation. 4.1. Introduction. 4.2. Globally defined functions. 4.2.1. Polynomial bases. 4.2.1. Example. 4.2.2. Example. 4.2.3. Example. 4.2.4. Conclusions. 4.3. Piecewisely defined functions. 4.4. Finite element generalized coordinates. 4.4.1. Convergence conditions. 4.4.2. Geometric isotropy. 4.4.3. Finite element families. 4.5. Finite element shape functions. 4.5.1. Natural coordinates. 4.5.2. Curvilinear coordinates. 4.5.3. Example. 4.6. Parametric finite elements. 4.7. Isoparametric finite elements. 4.7.1. Isoparametric finite elements. 4.7.2. Evaluation of element equations. 4.7.3. Numerical integration. 4.8. Linear triangular isoparametric element. 4.8.1. Example. 4.8.2. Example. 4.8.3. Example. 4.8.4. Example. 5. The finite element method. 5.1. Introduction. 5.2. Steady-state models with scalar variable. 5.2.1. Continuous model. 5.2.2. Weighted residual Galerkin approximation. 5.2.3. Discrete model. 5.3. Finite element mesh. 5.3.1. Linear triangular isoparametric element. 5.3.2. Total potential energy. 5.3.3. Internal potential energy density. 5.3.4. Mesh topology. 5.4. Local finite element equations. 5.5. Global finite element equations. 5.6. Exact boundary conditions. 5.7. Solution of the system of equations. 5.8. Computation of derivatives. 5.9. Finite element pre- and post-processing. 5.10. **Cgt.fem**: Package for finite element analysis. 5.10.1. Data preparation. 5.11. Example. 5.12. Example. 5.13. Example. 5.14. Example. 6. Fluid mechanics applications. 6.1. Introduction. 6.2. Continuous models of fluid flow. 6.2.1. Incompressible fluids. 6.2.2. Inviscid fluids. 6.2.3. Irrotational flows. 6.2.4. Steady-state flows. 6.2.5. Bernoulli's energy conservation. 6.2.6. Velocity potential. 6.2.7. Stream function. 6.3. Confined flows. 6.4. Unconfined flows. 6.5. Groundwater flows. 6.5.1. Darcy's hypothesis. 6.5.2. Dupuit's hypothesis. 6.6. Example. 6.6.1. Flow under a dam. 6.6.2. Problem's solution. 7. Solid mechanics applications. 7.1. Introduction. 7.2. Continuous models. 7.3. Fundamental continuous model: Elasticity theory. 7.3.1. Strain-displacement equations. 7.3.2. Equilibrium equations. 7.3.3. Stress-strain equations. 7.3.4. Boundary conditions. 7.3.5. Elastic fields. 7.3.6. The work theorem. 7.3.7. Theorem of virtual displacements. 7.3.8. Theorem of total potential energy. 7.4. Finite element model. 7.4.1. Weighted residual equation. 7.4.2. Theorem of work. 7.4.3. Theorem of virtual displacements. 7.4.4. Discretization. 7.5. Mesh topology. 7.5.1. Total strain energy. 7.5.2. Distribution of the strain energy density. 7.6. Constrained displacements. 7.7. Application of the finite element model. 7.8. Three-dimensional equilibrium states. 7.8.1. Constant-strain tetrahedron element. 7.9. Two-dimensional equilibrium states. 7.9.1. Plane stress and plane strain. 7.9.2. Asymptotic model: Plane elasticity. 7.9.3. Constant-strain triangular isoparametric element. 7.9.4. **Cst.fem**: Package for finite element analysis. 7.9.5. Data preparation. 7.9.6. Example. 7.9.7. Example. 7.9.8. Example. 7.9.9. Example. 7.10. One-dimensional equilibrium states. 7.10.1. Asymptotic model: theory of bars. 7.10.2. Truss element. 7.10.3. Skew elements. 7.10.4. Beam element. 7.11. Further study. A. The companion CD-Rom. References. Index.

*Acoustic Communication in Insects and Anurans: Common Problems and Diverse Solutions.* By H. Carl Gerhardt and Franz Huber. The University of Chicago Press, Chicago, IL. (2002). 531 pages. \$35.

Contents:

Preface. 1. Introduction. 2. Acoustic signals: Description and peripheral mechanisms. 3. Neural control of sound production. 4. Acoustic criteria for signal recognition and preferences. 5. Processing of biologically significant acoustic signals in the auditory periphery. 6. Processing of biologically significant sound signals in central auditory systems. 7. Sound localization. 8. Causes and consequences of chorusing. 9. Acoustic competition and alternative tactics. 10. Female choice based on acoustic signals. 11. Broad-scale patterns of evolution. Appendices. Literature cited. Index.

*Customer-Based IP Service Monitoring with Mobil Software Agents.* By Manuel Günter. Birkhäuser, Basel. 160 pages. \$39.95, sFr. 42, EUR 27.10.

Contents:

Abstract. Preface. 1. Introduction. 1.1. Overall scenario. 1.2. Advanced IP network services. 1.2.1. Internet-based virtual private network (VPN). 1.2.2. The security architecture for the internet protocol. 1.2.3. Differentiated services (DiffServ). 1.3. Agent technology. 1.4. Network and service management. 1.5. The problem and the proposed approach. 1.6. Outline of the book. 2. A service monitoring architecture. 2.1. Introduction and motivation. 2.2. Mobility and service monitoring. 2.2.1. Terminology. 2.2.2. Advantages of service monitoring with mobile agents. 2.3. The basic infrastructure. 2.3.1. Location of the control points. 2.3.2. Node architecture. 2.3.3. Authorization and filtering. 2.3.4. Security issues. 2.4. Mobility models and agent forwarding. 2.4.1. Supported mobility models. 2.4.2. Forwarding security. 2.5. Internet deployment. 2.5.1. Advanced infrastructure support. 3. Implementation of CSM. 3.1. The CSM protocol. 3.1.1. Overview. 3.1.2. Internet communication with Java. 3.1.3. Layering of the CSM protocol. 3.1.4. The protocol object. 3.1.5. Message objects. 3.1.6. CSM message exchange sequences. 3.2. The T-component and the raw packet protocol. 3.2.1. T-component implementations.